

PATENT
 Customer No. 22,852
 Attorney Docket No. 05788.0251

Amendments to the Claims:

The following listing of claims replaces all prior versions of the claims and all prior listings of the claims in the present application. Please amend claim 49 as follows:

Claims 1-28 (canceled)

Claim 29 (previously presented): A method for determining at least one parameter of a periodic spin function $\sigma(z)$ with period p , to be applied to an optical fibre along its length z , comprising:

selecting said at least one parameter so that

$$\left| \int_0^p y_1(z, \alpha'(z)) dz \right| \leq \epsilon_1$$

$$\int_0^p |y_1(z, \alpha'(z))| dz$$

where ϵ_1 is about 0.05 and y_1 is the first of the three components $y_1(z)$, $y_2(z)$, $y_3(z)$ of a periodic function $\bar{y}(z)$ of period p such that

$$\frac{dy_1}{dz} = 2\alpha'(z)y_2$$

$$\frac{dy_2}{dz} = -\frac{2\pi}{L_B} y_3 - 2\alpha'(z)y_1$$

$$\frac{dy_3}{dz} = \frac{2\pi}{L_B} y_2$$

where L_B is an expected beat length of said optical fibre and $\alpha'(z)$ is the derivative of the spin function $\sigma(z)$ with respect to the length z .

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Claim 30 (previously presented): A method for making an optical fibre comprising:

- (a) heating a fibre preform to a drawing temperature;
- (b) providing a periodic spin function $\alpha(z)$ with period $p > 2 \text{ m}$; and
- (c) drawing said optical fibre from said preform, while simultaneously creating a relative spin between said optical fibre and said preform with said spin function;

step (b) further comprising selecting said spin function so that

$$\frac{\left| \int_0^p y_1(z, \alpha'(z)) dz \right|}{\int_0^p |y_1(z, \alpha'(z))| dz} \leq \epsilon_1$$

where ϵ_1 is about 0.05 and y_1 is the first of the three components $y_1(z)$, $y_2(z)$, $y_3(z)$ of a periodic function $\vec{y}(z)$ of period p such that

$$\begin{aligned} \frac{dy_1}{dz} &= 2\alpha'(z)y_2 \\ \frac{dy_2}{dz} &= -\frac{2\pi}{L_B} y_3 - 2\alpha'(z)y_1 \\ \frac{dy_3}{dz} &= \frac{2\pi}{L_B} y_2 \end{aligned}$$

where L_B is an expected beat length of said optical fibre and $\alpha'(z)$ is the derivative of the spin function $\alpha(z)$ with respect to the length z .

Claim 31 (previously presented): A method as in claim 30, wherein p is lower than 20 m.

Claim 32 (previously presented): A method as in claim 30, wherein L_B is greater than 0.5 m.

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Claim 33 (previously presented): A method as in claim 32, wherein L_B is greater than 5 m.

Claim 34 (previously presented): A method as in claim 30, wherein an amplitude A of said spin function is lower than 50 turns/m.

Claim 35 (previously presented): A method as in claim 34, wherein A is lower than 10 turns/m.

Claim 36 (previously presented): A method as in claim 34, wherein A is greater than 3 turns/m.

Claim 37 (previously presented): A method as in claim 34, wherein a ratio between an amplitude A and a distance r between two inversion sites of said spin function is lower than 10 turns/m².

Claim 38 (previously presented): A method as in claim 30, wherein said step of drawing is performed at a drawing speed not lower than 5 m/s.

Claim 39 (previously presented): A method for making an optical fibre having NA ≥ 0.2 comprising:

- (a) heating a fibre preform to a drawing temperature;
- (b) providing a periodic spin function $\sigma(z)$ with period p; and
- (c) drawing said optical fibre from said preform, while simultaneously creating a relative spin between said optical fibre and said preform with said spin function;
step (b) further comprising selecting said spin function so that

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$$\left| \int_0^p y_1(z, \alpha'(z)) dz \right| \leq \epsilon_1$$

$$\int_0^p |y_1(z, \alpha'(z))| dz$$

where ϵ_1 is about 0.05 and y_1 is the first of the three components $y_1(z)$, $y_2(z)$, $y_3(z)$ of a periodic function $\bar{y}(z)$ of period p such that

$$\frac{dy_1}{dz} = 2\alpha'(z)y_2$$

$$\frac{dy_2}{dz} = -\frac{2\pi}{L_B} y_3 - 2\alpha'(z)y_1$$

$$\frac{dy_3}{dz} = \frac{2\pi}{L_B} y_2$$

where L_B is an expected beat length of said optical fibre and $\alpha'(z)$ is the derivative of the spin function $\alpha(z)$ with respect to the length z .

Claim 40 (previously presented): A method as in claim 39, wherein L_B is lower than 5 m.

Claim 41 (previously presented): A method as in claims 29, 30 or 39, wherein $p < L_B$.

Claim 42 (previously presented): A method as in claims 29, 30 or 39, wherein ϵ_1 is about 0.01.

Claim 43 (previously presented): A method as in claim 42, wherein ϵ_1 is about 0.008.

Claim 44 (previously presented): A method as in claim 43, wherein ϵ_1 is about 0.002.

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Claim 45 (previously presented): A method as in claims 29, 30 or 39, wherein said spin function is a sinusoidal function.

Claim 46 (previously presented): A method as in claims 29, 30 or 39, wherein said spin function is a triangular function.

Claim 47 (previously presented): A method as in claims 29, 30 or 39, wherein said spin function is a trapezoidal function.

Claim 48 (previously presented): An optical fibre comprising at least a section having a beat length L_B and a periodic spin function $\alpha(z)$ with period $p > 2 m$ impressed therein,

said spin function being such that

$$\left| \frac{\int_0^p y_1(z, \alpha'(z)) dz}{\int_0^p |y_1(z, \alpha'(z))| dz} \right| \leq \varepsilon_1$$

where ε_1 is about 0.05 and y_1 is the first of the three components $y_1(z)$, $y_2(z)$, $y_3(z)$ of a periodic function $\vec{y}(z)$ of period p such that

$$\begin{aligned}\frac{dy_1}{dz} &= 2\alpha'(z)y_2 \\ \frac{dy_2}{dz} &= -\frac{2\pi}{L_B} y_3 - 2\alpha'(z)y_1 \\ \frac{dy_3}{dz} &= \frac{2\pi}{L_B} y_2\end{aligned}$$

and $\alpha'(z)$ is the derivative of the spin function $\alpha(z)$ with respect to the length z .

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Claim 49 (currently amended): An optical fibre as in claim 48, wherein said optical fibre has a PMD coefficient, and said PMD coefficient is lower than or equal to $0.05 \text{ ps}/[\text{mk}] \text{km}^{1/2}$.

Claim 50 (previously presented): An optical fibre as in claim 48, wherein a length of said section of optical fibre is higher than or equal to 10 times the period p of the spin function.

Claim 51 (previously presented): An optical fibre having $\text{NA} \geq 0.2$, comprising at least a section having a beat length L_B and a periodic spin function $\alpha(z)$ with period p impressed therein,

said spin function being such that

$$\frac{\left| \int_0^p y_1(z, \alpha'(z)) dz \right|}{\int_0^p |y_1(z, \alpha'(z))| dz} \leq \epsilon_1$$

where ϵ_1 is about 0.05 and y_1 is the first of the three components $y_1(z)$, $y_2(z)$, $y_3(z)$ of a periodic function $\bar{y}(z)$ of period p such that

$$\begin{aligned} \frac{dy_1}{dz} &= 2\alpha'(z)y_2 \\ \frac{dy_2}{dz} &= -\frac{2\pi}{L_B} y_3 - 2\alpha'(z)y_1 \\ \frac{dy_3}{dz} &= \frac{2\pi}{L_B} y_2 \end{aligned}$$

and $\alpha'(z)$ is the derivative of the spin function $\alpha(z)$ with respect to the length z .

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Claim 52 (previously presented): An optical fibre having a length lower than 1 km, comprising at least a section having a beat length L_B and a periodic spin function $\alpha(z)$ with period p impressed therein,

said spin function being such that

$$\frac{\left| \int_0^p y_1(z, \alpha'(z)) dz \right|}{\int_0^p |y_1(z, \alpha'(z))| dz} \leq \epsilon_1$$

where ϵ_1 is about 0.05 and y_1 is the first of the three components $y_1(z), y_2(z), y_3(z)$ of a periodic function $\bar{y}(z)$ of period p such that

$$\begin{aligned}\frac{dy_1}{dz} &= 2\alpha'(z)y_2 \\ \frac{dy_2}{dz} &= -\frac{2\pi}{L_B} y_3 - 2\alpha'(z)y_1 \\ \frac{dy_3}{dz} &= \frac{2\pi}{L_B} y_2\end{aligned}$$

and $\alpha'(z)$ is the derivative of the spin function $\alpha(z)$ with respect to the length z .

Claim 53 (previously presented): An optical fibre as in claim 52, wherein said fibre length is lower than 500 m.

Claim 54 (previously presented): An optical fibre as in claim 52, wherein said fibre length is lower than 200 m.

Claim 55 (previously presented): An optical telecommunication system comprising:

an optical transmission line;

at least one transmitter for adding a signal to said transmission line; and

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at least one receiver for receiving said signal from said transmission line;
said transmission line comprising at least one optical fibre according to any one
of claims 48 to 54.

**Claim 56 (previously presented): An article comprising at least one optical fibre
according to any one of claims 48 to 54.**